AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A velocity estimator using a level crossing rate, comprising:

a power calculator for calculating power values of a signal received from a mobile terminal;

a mean power calculator for calculating mean power values for M power values according to a predetermined down-sampling factor M;

an interpolator for interpolating the mean power values according to a predetermined interpolation ratio L;

a root mean square calculator for calculating a root mean square value using an output of the interpolator;

a level crossing counter for counting a level crossing frequency representing how many times the output of the interpolator crosses a level crossing threshold determined according to the root mean square value, for a predetermined time period; and

a velocity calculator for calculating a velocity estimation value of the mobile terminal using the level ~~velocity~~ crossing frequency.

2. (Original) The velocity estimator of claim 1, further comprising a down-sampling factor calculator for determining with the velocity estimation value a down-sampling factor M for a next time period so that an interval between Doppler spectrums of reception signal power can be minimized while no aliasing occurs, and providing the determined down-sampling factor M to the mean power calculator.

3. (Original) The velocity estimator of claim 2, wherein the down-sampling factor M is calculated by

$$M = \left[\frac{f_s}{2f_D} \right]$$

where f_s is a sampling frequency and f_D is a maximum Doppler frequency.

4. (Original) The velocity estimator of claim 1, where the interpolation ratio L is

at least 4.

5. (Original) The velocity estimator of claim 1, wherein the level crossing counter determines, upon occurrence of level crossing, whether a level crossing duration representing a time interval between a current level crossing time and a previous level crossing time is shorter than a predetermined value, and disregards the occurred level crossing in order not to count the level crossing frequency if the level crossing duration is shorter than the predetermined value.

6. (Original) The velocity estimator of claim 1, wherein the level crossing threshold is set equal to the root mean square value.

7. (Original) The velocity estimator of claim 1, wherein the velocity estimation value is calculated by

$$v_{LCR} = \frac{\lambda_c L_R e}{\sqrt{2\pi}}$$

where v_{LCR} is the velocity estimation value, λ_c is a wavelength of a carrier, L_R is the level crossing frequency, and e is a natural logarithm.

8. (Original) A velocity estimator using a level crossing rate, comprising:

a down-sampler for down-sampling a signal received from a mobile terminal according to a predetermined down-sampling factor M;

a power calculator for calculating power values of the down-sampled signal;

an interpolator for interpolating the power values according to a predetermined interpolation ratio L;

a root mean square calculator for calculating a root mean square value using an output of the interpolator, wherein the root mean square value becomes a level crossing threshold;

a level crossing counter for counting the level crossing frequency representing how many times the output of the interpolator crosses the level crossing threshold for a predetermined time period; and

a velocity calculator for calculating a velocity estimation value of the mobile terminal using the level crossing frequency.

9. (Original) The velocity estimator of claim 8, further comprising a down-sampling factor calculator for determining with the velocity estimation value a down-sampling factor M for a next time period so that an interval between Doppler spectrums of reception signal power can be minimized while no aliasing occurs, and providing the determined down-sampling factor M to the down-sampler.

10. (Original) The velocity estimator of claim 9, wherein the down-sampling factor M is calculated by

$$M = \left\lfloor \frac{f_s}{2f_D} \right\rfloor$$

where f_s is a sampling frequency and f_D is a maximum Doppler frequency.

11. (Original) The velocity estimator of claim 8, where the interpolation ratio L is at least 4.

12. (Original) The velocity estimator of claim 8, wherein the level crossing counter determines, upon occurrence of level crossing, whether a level crossing duration representing a time interval between a current level crossing time and a previous level crossing time is shorter than a predetermined value, and disregards the occurred level crossing in order not to count the level crossing frequency if the level crossing duration is shorter than the predetermined value.

13. (Original) The velocity estimator of claim 8, wherein the level crossing threshold is set equal to the root mean square value.

14. (Original) The velocity estimator of claim 8, wherein the velocity estimation value is calculated by

$$v_{LCR} = \frac{\lambda_c L_R e}{\sqrt{2\pi}}$$

where v_{LCR} is the velocity estimation value, λ_c is a wavelength of a carrier, L_R is the level crossing frequency, and e is a natural logarithm.

15. (Currently Amended) A velocity estimation method using a level crossing rate, comprising the steps of:

calculating power values of a signal down-sampled with a signal received from a mobile terminal;

interpolating the power values according to a predetermined interpolation ratio;

calculating a root mean square value using the interpolated values, wherein the root mean square value becomes a level crossing threshold;

counting a level crossing frequency representing how many times the interpolated values cross the level crossing threshold for a predetermined time period; and

calculating a velocity estimation value of the mobile terminal using the level ~~velocity~~ crossing frequency.

16. (Original) The velocity estimation method of claim 15, wherein the step of calculating power values of a down-sampled signal comprises the step of calculating power values of a signal received from the mobile terminal, and calculating mean power values for M power values according to a predetermined down-sampling factor M, wherein the mean power values become power values of the down-sampled signal.

17. (Original) The velocity estimation method of claim 15, wherein the step of calculating power values of a down-sampled signal comprises the step of down-sampling a signal received from the mobile terminal according to a predetermined down-sampling factor M, and calculating power values of the down-sampled signal.

18. (Original) The velocity estimation method of claim 15, further comprising the step of determining with the velocity estimation value a down-sampling factor M for a next time period so that an interval between Doppler spectrums of reception signal power

can be minimized while no aliasing occurs.

19. (Original) The velocity estimation method of claim 15, wherein the down-sampling factor M is calculated by

$$M = \left\lfloor \frac{f_s}{2f_D} \right\rfloor$$

where f_s is a sampling frequency and f_D is a maximum Doppler frequency.

20. (Original) The velocity estimation method of claim 15, where the interpolation ratio L is at least 4.

21. (Original) The velocity estimation method of claim 15, wherein the counting step comprises the step of determining, upon occurrence of level crossing, whether a level crossing duration representing a time interval between a current level crossing time and a previous level crossing time is shorter than a predetermined value, and disregarding the occurred level crossing in order not to count the level crossing frequency if the level crossing duration is shorter than the predetermined value.

22. (Original) The velocity estimation method of claim 15, wherein the level crossing threshold is set equal to the root mean square value.

23. (Original) The velocity estimation method of claim 15, wherein the velocity estimation value is calculated by

$$v_{LCR} = \frac{\lambda_c L_R e}{\sqrt{2\pi}}$$

where v_{LCR} is the velocity estimation value, λ_c is a wavelength of a carrier, L_R is the level crossing frequency, and e is a natural logarithm.